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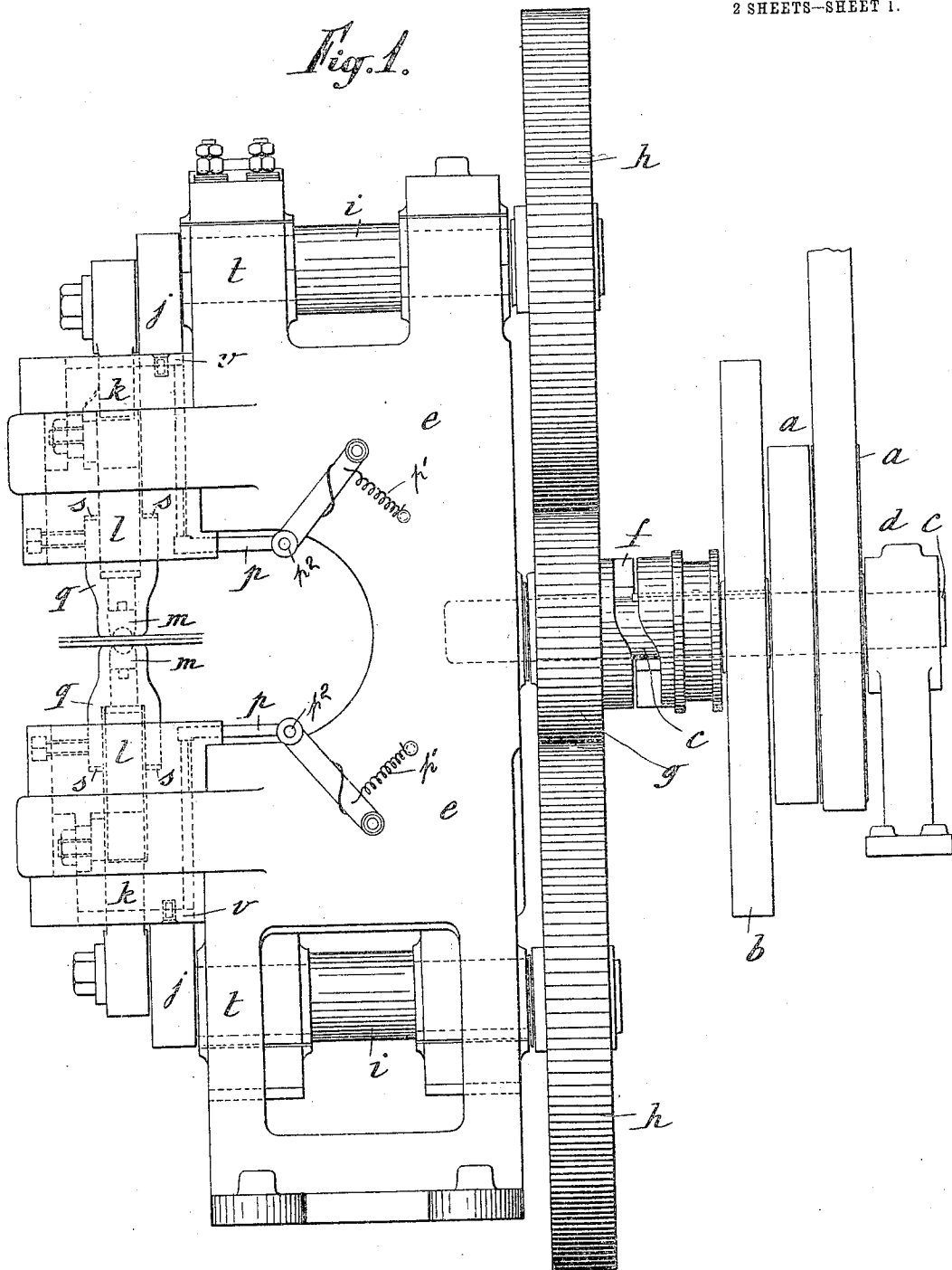
G. ERMEL.

RIVETING MACHINE.

APPLICATION FILED AUG. 25, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



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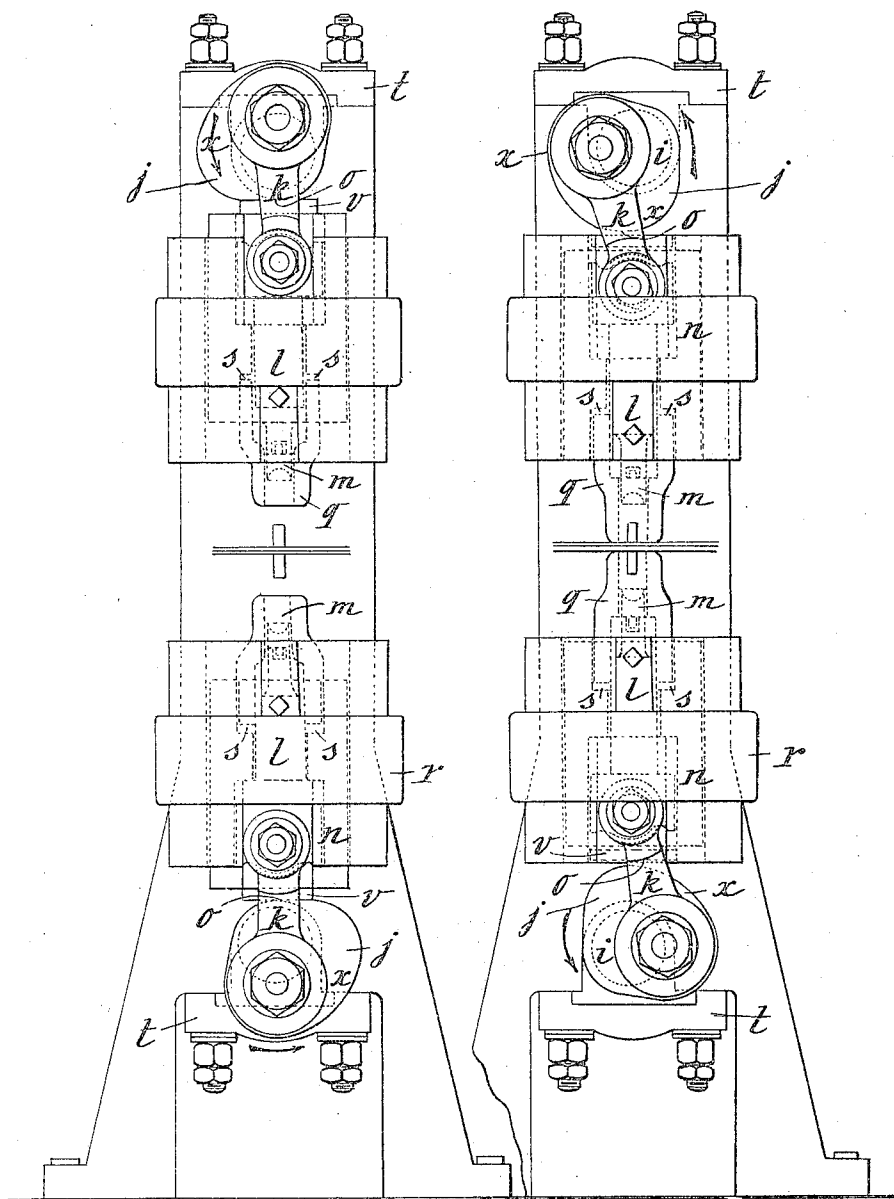
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2 SHEETS—SHEET 2.

Fig. 2.

Fig. 3.



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GEORGES ERMEL, OF LIEGE, BELGIUM.

RIVETING-MACHINE.

No. 807,668.

Specification of Letters Patent.

Patented Dec. 19, 1905.

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To all whom it may concern:

Be it known that I, GEORGES ERMEL, a subject to the King of Belgium, and a resident of 57 Rue des Wallons, Liege, Belgium, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

This invention relates to a riveting-machine for riveting metallic structures wherein simple rod-shaped blanks of iron or steel previously heated to a red heat have both their ends simultaneously formed into heads after having been placed in the rivet-holes of the structure. This process does away with the usual preparatory manufacture of rivet-blanks having a head at one end, and thus considerably reduces the cost of manufacture.

The improved machine is shown by way of example on the accompanying drawings, in which—

Figure 1 is a side elevation of the machine. Figs. 2 and 3 are front views showing the different positions of these parts, as will be presently described.

The working parts are mounted on a frame and comprise the following devices: First, two pulleys *a a*, one loose and the other fast, mounted on a shaft *c*. Secondly, a fly-wheel *b*, fixed on the shaft *c*, which runs in the bearing of a support *d* and in a recess formed in the back of the framing *e*. Thirdly, a clutch device *f*, mounted on the shaft *c* and serving to transmit the motion of the driving-gear to the working device by means of a toothed pinion *g*, mounted loose on shaft *c* and forming part of the clutch *f*. Fourthly, two toothed wheels *h h*, gearing with the pinion *g* and fixed on two shafts *i i*, with crank-disks *j j* running in bearings *t t*. The crank-disks have the form of a cam, of which the one part *x x* is circular, the center thereof coinciding with that of the shafts *i i*. The diameters of the toothed wheels *h h* are multiples of that of the pinion *g*. Fifthly, two rods *k k*, connected to the pins of the cranks and each actuating a pressing-piston *l*, having at its extremity a mold or die *m*, suitable for forming the head of a rivet, and, if necessary, made interchangeable; sixthly, two cylinders *n n*, that are always in contact at *o* with the disk-cams *j j*, being pressed against the same by means of bell-crank levers *p p*, pivoted at *p'* to the frame and acted upon by springs *p' p'*, the ends of which are attached to the frame *e* and to the rear arm of said levers *p p*, respectively, the cylinders

n n having thus a constant tendency to move apart from each other. These cylinders work in cylindrical casings *r r*, formed on the framing. The point of contact *o* is constituted by a plate *v*, that can be changed in case of wear and which is screwed to the cylinder. Seventhly, two hollow cylindrical pieces *q q*, that can be changed according to the work to be done and which are introduced into the above-named cylinders and are secured thereto by a set-screw, so that these pieces participate in the motion of the said cylinders. Spaces *s s* are left between the ends of the pieces *q q* and the recesses in the cylinders, in which are placed a greater or less number of washers, so as to regulate exactly the position of the outer ends of the pieces *q q*. The two pressing-pistons *l l* mentioned above slide freely within the cylinders *n n* and the pieces *q q*. The two cylinders, with their pieces *q q*, the rods, and the pistons, each receive an identical and simultaneous to-and-fro motion, but in contrary directions to each other, and are so arranged that they move equal distances to and from the center line of the pinion and the framing. The limits of the approach of the pistons are determined by the thickness of the structure to be riveted, and the limits of their motion away from each other depend upon the action of the above-described devices.

The object of the cylinders *n n* is, in the first place, to guide the pistons *l l* in their travel, and, secondly, to grip, by means of pieces *q q*, the structure to be riveted firmly between them during the riveting action of the pressing-pistons *l l*, after which they recede together with these for liberating the structure. The cams *j j* have for their object to operate the cylinders, which are always kept in contact with the same, as above described. They rotate with the shafts *i i*, to which they are fixed. They have a peculiar curved form, as shown on the drawings, for forcing the cylinders toward each other, maintaining them in a certain position during a certain time, and for afterward allowing them to separate. The rods *k* receive their motion from the crank-pins and transmit the same to the pistons, the ends *m* of which constitute the dies for forming the rivet-heads.

It will be seen that the functions of the above-described parts are dependent upon each other and act simultaneously in contrary directions, both the riveting devices being actuated simultaneously by one and the same

driving-gear, which is constituted by the pinion *g*, which drives simultaneously both the wheels *h h*.

The machine operates in the following manner: Shaft *c* and fly-wheel *b* being set in motion and the structure to be riveted being placed in the said rivet-holes exactly in the center line of the riveting-pistons and a heated rivet-blank being introduced with one of the rivet-holes, the shafts *i i* are then set in motion by moving into gear the clutch *f*. Figs. 1, 2, and 3 will readily show the various phases of the operation. Fig. 2 shows the riveting devices out of action with the structure to be riveted and a rivet-blank placed in position. Fig. 3 shows the machine at the moment where the structure to be riveted is gripped between the pieces *q q* and the riveting-pistons being ready to operate on the ends of the rivet-blank, which are confined within the parts *q q*. The following simultaneous actions then take place: First, the cams in revolving bear with their circular portion *x x* upon the ends of the cylinders *n*, so as to cause them to continue to grip the structure to be riveted; second, the pistons *l l*, continuing their motion toward each other, effect a simultaneous pressure upon both ends of the rivet-blank. Fig. 1 shows the position of the parts when the above-described operation has been completed. By the continued rotation of the driving-shaft the cams in receding from the cylinders allow these, together with the pieces *q q*, to be moved away from the structure, and the rods *k* and the cranks at the same time withdraw the riveting-pistons into their original position, as shown at Fig. 2.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination, in a machine for riveting structures by means of rod-shaped blanks, a horseshoe-shaped frame with oppositely-arranged hollow heads, two hollow cylinders sliding into said heads and provided at their inner ends with adjustable cylindrical jaws for gripping the structure to be riveted, two plungers sliding into said cylinders and jaws and provided at their inner ends with adjustable dies for forming the heads of the rivet,

two revolving shafts, two toothed wheels keyed at the rear ends of said shafts, two cams keyed at the forward ends of said shafts for actuating said cylinders, spring-actuated bell-crank levers for constantly pressing said cylinders against said cams, two cranks pivoted to said cams and to said plungers respectively for actuating the latter, and a driving-pinion meshing with said toothed wheels to impart to said jaws and plungers reciprocating motions which are respectively depending upon one another, simultaneous, of equal extent and power and of contrary directions, substantially as described.

2. In combination, in a machine for riveting structures by means of rod-shaped blanks, a horseshoe-shaped frame with oppositely-arranged hollow heads, two hollow cylinders sliding into said heads and provided at their inner ends with adjustable cylindrical jaws for gripping the structures to be riveted, two plungers sliding into said cylinders and jaws and provided at their inner ends with adjustable dies for forming the heads of the rivets, two parallel shafts, symmetrically-arranged cams keyed on the forward ends of said shafts and having respectively a part of their edges which is concentric to the centers of said shafts, said cams being adapted to actuate said cylinders and said plungers respectively by means of their edges and by means of cranks pivoted to said cams and said plungers, spring-actuated bell-crank levers for constantly pressing said cylinders against said cams, two toothed wheels keyed respectively on the rear ends of said shafts, a single driving-pinion for actuating said wheels and consequently said shafts, said jaws and dies thus receiving respectively reciprocating motions which are depending upon one another, simultaneous, of equal extent and power and of contrary directions, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGES ERMEL.

Witnesses:

JOUST HAFFIN,
ED. CHIRIONET.